



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/845,111	04/27/2001	Keith J. Williams	80,245	1619

26384 7590 11/19/2002

NAVAL RESEARCH LABORATORY
ASSOCIATE COUNSEL (PATENTS)
CODE 1008.2
4555 OVERLOOK AVENUE, S.W.
WASHINGTON, DC 20375-5320

EXAMINER

KIANNI, KAVEH C

ART UNIT	PAPER NUMBER
----------	--------------

2877

DATE MAILED: 11/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/845,111

Applicant(s)

WILLIAMS ET AL.

Examin r

Kevin C Kianni

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 9-15 and 17-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Townsend (US 5675648).

Regarding claim 1, Townsend teaches a fiber optic modulator system (shown at least in figure 4), comprising: an optical source 48; a first coupler FC for splitting a signal received from said source into two optical paths (see fig. 4, item the input FC of the interferometer; also col. 4, lines 8-16 and 45-48), said two paths forming a Mach Zender Modulator (see col. 3, lines 26-33; wherein modulating mach-zender interferometer forming a MZM); a phase modulator 41/42 disposed in a first optical path (see fig. 4, items modulators in first/second optical paths; col. 4, line 49); a piezo-electric transducer (PZT) disposed in a second optical path (see polarization compensation—PC—for the rapped fiber rings in the first/second optical paths controlled with a PZT, and col. 6, lines 1-18); a second coupler FC for recombining said first and second optical paths (shown in fig. 4, item the combiner second coupler FC combining the first and second optical paths); and a detector (ADP: avalanche photo diode) for detecting

the output from said second coupler (see fig. 4, item ADP detecting output of the second coupler FC; also col. 6, lines 15-20).

However, Townsend does not specifically teach wherein the above coupler is a PM coupler. Nevertheless, Townsend states that his modulation system is designed for minimum amount of polarization change in which optical polarization in the system would be maintained (see col. 2, lines 1-8). Thus, it would have been obvious to a person of ordinary skill in the art when the invention was made to replace Townsend's couplers with that of conventional PM couplers since resultant system would enable long distance communication effectively (col. 2, lines 2-9; see US 5272513 proved herein as prior art).

Regarding claim 2, Townsend further teaches a fiber tap for sampling output from the second PM coupler (see fig. 4, item tap fiber of the output coupler FC connector to the photodiode APD for sampling) ;a d.c. photodetector APD for detecting the output of said fiber tap; and a phase locked loop system disposed to receive a signal from said d.c. photodetector APD, said PLL system providing a feedback signal to said PZT for controlling the relative phases of said first and second optical paths (see fig. 4, feedback loop from photodiode APD to PC/PZT and col. 6, lines 1-20; wherein the relative phases of the first and second optical paths is changed as a result of change in the fiber).

Regarding claim 3, Townsend further teaches wherein said PZT controls the optical path length of said second optical path (see col. 6, lines 10-18).

Regarding claim 4, Townsend further teaches wherein said phase modulator is made of lithium niobate (LiNbO_3) (see col. 4, lines 49-50).

Regarding claim 5, Townsend further teaches wherein said phase modulator imprints a signal into said first optical path for modulating a signal from said optical source (see fig. 4, items 48-49 and 41; col. 4, lines 34-40). However, Townsend does not specifically teach wherein the above signal is an analog signal. Nevertheless, Townsend states that the modulation system operates in standard analog mode (col. 5, line 41). Thus, it is well known to those of ordinary skill in the art that a system working in analog mode would transmit an analog signal to a destination, in order to enable long distance communication effectively (col. 2, lines 2-9).

Regarding claim 9, Townsend further teaches fiber disposed in said first optical path between said phase modulator and said second coupler (see fig. 4, items fibers). However, Townsend does not teach wherein the above fiber is erbium doped fiber amplifier. The examiner takes official notice regarding this limitation since it is very conventional using such fiber (see for example US 6259552 provided herein as prior art), since such a fiber in the modulation system would provide predetermined

Art Unit: 2877

relationship between the phase or polarization of the transmitter and receiver (col. 2, lines 15-17).

Regarding claim 10, Townsend further teaches: a second phase modulator disposed in said second path (see fig. 4, the item phase modulators 41/42 are in first/second optical paths; col. 4, lines 49-50).

Regarding claim 11, Townsend teaches in a fiber optic communication system (shown at least in figure 4) having at least one fiber optic modulator 41, a method of enhancing the performance of the communication system (col. 2, lines 2-8) comprising: fiber optic links (see fig. 4, fiber links) comprising the steps of: providing an optical source 48; splitting signals from said optical source into first and second paths (see fig. 4, item 48 and splitter FC; also col. 4, lines 8-16 and 45-48), said first and second paths forming a Mach-Zender Modulator cavity (see col. 3, lines 26-33; wherein modulating mach-zender interferometer forming a MZM cavity in which the optical paths are modulated through modulators 41/42 forming MZM cavity); phase modulating the signals in said first optical path (see fig. 4, items modulators in first/second optical paths; col. 4, line 49); controlling optical path length of said first and second paths (see polarization compensation PC for the rapped fiber rings in the first/second optical paths controlled with a PZT, and col. 6, lines 1-18); combining the signals in said first and second paths (shown in fig. 4, item the combiner second coupler FC combining the first and second optical paths); and detecting the combined signals (see fig. 4, item ADP

Art Unit: 2877

detecting output of the second coupler FC; also col. 6, lines 15-20). Regarding the limitation PM couplers, the arguments presented in rejection of claim 1 is analogous in rejection of claim 11.

Regarding claim 12, Townsend further teaches sampling the combined signals (see fig. 4, item tap fiber of the output coupler FC connector to the photodiode APD for sampling); detecting the sampled signals (see detector ADP); and controlling the relative phases of said first and second paths (see fig. 4, feedback loop from photodiode APD to PC/PZT and col. 6, lines 1-20; wherein the relative phases of the first and second optical paths is changed as a result of change in the fiber).

Regarding claims 13-14. Townsend further teaches wherein a LiNbo3 phase modulator modulates the signals in said first optical path (see col. 4, lines 49-50).

Regarding claim 15, Townsend further teaches inputting a signal to control the modulation of signals in said first path (see fig. 4, items 48-49 and 41; col. 4, lines 34-40). However, Townsend does not specifically teach wherein the above signal is an analog signal. Nevertheless, Townsend states that the modulation system operates in standard analog mode (col. 5, line 41). Thus, it is well known to those of ordinary skill in the art that a system working in analog mode would transmit an analog signal to a destination, in order to enable long distance communication effectively (col. 2, lines 2-9).

Regarding claim 17, Townsend further teaches disposing a second phase modulator 41/42 in said second path to allow for dual drive modulation (see fig. 4, items modulators 41/42 in first and second paths and col. 4, line 1).

Regarding claim 18, Townsend further teaches wherein the output of said second PM coupler is detected using a plurality of photodetectors (col. 4, lines 49-52).

Regarding claim 19, Townsend further teaches wherein the outputs of said photodetectors are subtracted to implement a balanced detection scheme (see col. 4, line 51-col. 5, lines 49-67, wherein the subtraction/summation of signals are carried out by photo-detectors ADPs in which signal levels are balanced by minimized or maximized signals level, see col. 6, lines 18-20).

Regarding claim 20, Townsend further teaches a fiber optic link system for transmitting signals from a source to a destination (shown at least in figure 4) having a fiber optic modulator 41/42, the fiber optic modulator comprising: an optical source 48; a first coupler FC for splitting a signal received from said source into two optical paths (see fig. 4, item the input FC of the interferometer; also col. 4, lines 8-16 and 45-48), said two paths forming a Mach Zender Modulator (see col. 3, lines 26-33; wherein modulating mach-zender interferometer forming a MZM); a phase modulator 41/42 disposed in a first optical path (see col. 3, lines 26-33; wherein modulating mach-zender

interferometer forming a MZM); a piezo-electric transducer (PZT) disposed in a second optical path (see polarization compensation PC for the rapped fiber rings in the first/second optical paths controlled with a PZT, and col. 6, lines 1-18); a second PM coupler for recombining said first and second paths; and a detector for detecting the output of said second coupler (see fig. 4, item ADP detecting output of the second coupler FC; also col. 6, lines 15-20). Regarding the limitation PM couplers, the arguments presented in rejection of claim 1 is analogous in rejection of claim 20.

Regarding claim 21, the arguments presented in rejection of claim 2 is analogous in rejection of claim 21.

3. Claims 6-8 and 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over combination of Townsend and Farina et al. (US 5193128).

Regarding claims 6-7 and 16 Townsend teaches all limitations that the base claims that these claims depend on. Townsend further teaches wherein said phase modulator enables phase modulation of signals in said first optical path by imprinting an analog signal onto said first path (see analogous rejection presented in rejecting claim 5 is analogous in rejection of claim 16); the phase modulation being detected by said second coupler (fig. 4, second FC); wherein said phase modulator maintains optical polarization of signals from said optical source 48 (see col. 2, lines 1-8) and controlling the length of said second optical path (see col. 6, lines 10-18).

However, Townsend does not specifically teach wherein the above underlined signal is an RF signal. Nevertheless, Farina states that the frequency range of the above signal is 100 MHz. This limitation is more specifically taught by Farina. Farina teaches a MZM modulation system (shown in fig. 1-2) that includes the above limitation (see col. 6, lines 37). Thus, Farina provides a modulation system for reliable operation of MZM (col. 2, lines 60-68). Therefore, it would have been obvious to a person of ordinary skill in the art when the invention was made to modify Townsend's modulator's transmitter 49 frequency by including the frequency range taught by Farina in order to produce a MZM system that includes the above limitation, since the resultant system would provide predetermined relationship between the phase or polarization of the transmitter and receiver (col. 2, lines 15-17).

Regarding claim 8, Townsend teaches a laser source 48, however, Townsend does not explicitly teach wherein the laser is of a diode pumped ND:YAG ring cavity laser. The examiner takes official notice of source as being is a diode pumped ND:YAG ring cavity laser in which this source is conventional (see US 5239401, fig. 9, item 130; col. 10, line 10, provided herein as prior art) since such a system would provide predetermined relationship between the phase or polarization of the transmitter and receiver (col. 2, lines 15-17).

Citation of Relevant Prior Art

4. Prior art made of record and not relied upon is considered pertinent to applicant's disclosure. In accordance with MPEP 707.05 the following

references are pertinent in rejection of this application since they provide substantially the same information disclosure as this patent does. These references are:

Bush 4486657

Thaniyavarn 5751248

Sadot et al. 6411756

Olshansky 5239401 teaches pumped nd:Yag pumped laser diode

Vabala et a. 5272513 teaches PM couplers

Boffi et al. 6259552 teaches erbium fiber doped amplifiers

These references are cited herein to show the relevance of the apparatus/methods taught within these references as prior art.

Contact Information

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaveh Cyrus Kianni whose telephone number is (703) 308-1216.

The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 6:00 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font, can be reached at (703) 308-4881.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 308-7722, (for formal communications intended for entry)

Art Unit: 2877

or:

(703) 308-7721, (for informal or draft communications, please label
"PROPOSED" or "DRAFT")

Hand delivered responses should be brought to Crystal Plaza 4,
2021 South Clark Place, Arlington, VA., Fourth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application
should be directed to the Group Receptionist whose telephone number is (703)
308-0956.

Kevin Cyrus Kianni
Patent Examiner
Group Art Unit 2877



Frank Font
Supervisory Patent Examiner
Group Art Unit 2877

November 12, 2002